

METAL PROGRESS

Subject Index

Vol. 97, January 1970 through June 1970

Aerospace

Aluminum-Boron Composites for Aerospace Structures, by J. L. Christian, H. D. Forest, and M. D. Weisinger .. 5-113

Materials Challenges in Future Space Programs, by Lawrence J. Korb and L. K. Crockett 3-99

Aircraft

Cost Factors Affecting Titanium Forming, by C. C. Lacy and A. T. Taylor 3-76

Creep Forming Is Production Process, by Louis E. Frost 3-86

Evaluating Paint Systems for Aircraft, by M. C. Miyaji and W. M. Sutherland 6-101

How GE Is Bridging the Processability Gap ... Coatings Lengthen Jet Engine Life, by Frank J. Hermanek Jr. 3-104

How GE Is Bridging the Processability Gap ... Dip Brazing 7005 Aluminum Fan Vanes, by E. C. Helder and J. F. Rudy 3-110

How GE Is Bridging the Processability Gap ... An ECM Process for Drilling Deep Holes, by Cletis Jackson 3-106

How GE Is Bridging the Processability Gap ... Electrolyte Control in Electrochemical Machining, by T. M. Mercer 3-136

Materials Systems in Action ... The Pratt & Whitney Gas Turbine Story, Elihu F. Bradley, D.G. Phinney, and Matthew J. Donachie Jr. 3-68

Materials Technology for Borsic-Aluminum Aircraft Parts, by Kenneth G. Kreider and Edward M. Breinan 5-104

Solving Problems in Making the 'Biggest Bird,' by J.E. Gilmer 3-81

Alloy steels

Cooling Transformation Diagram for AISI O1 Tool Steel 2-72

How Grain Size and Cooling Rate Affect AISI 8620, by Clements F. zurLippe and John D. Grozier 1-94

Aluminum alloys

Aluminum-Boron Composites for Aerospace Structures, by J. L. Christian, H. D. Forest, and M. D. Weisinger .. 5-113

Guide for Selecting Filler Metals for Heat-Treatable Aluminum Alloys 3-94

Guide for Selecting Filler Metals for Nonheat-Treatable Aluminum Alloys 3-93

How GE Is Bridging the Processability Gap ... Dip Brazing 7005 Aluminum Fan Vanes, by E. C. Helder and J. F. Rudy 3-110

Materials Technology for Borsic-Aluminum Aircraft Parts, by Kenneth G. Kreider and Edward M. Breinan 5-104

Process Factors Affecting Finish of Aluminum Alloy Extrusions, by Edmund C. Franz 6-80

Where Aluminum Extrusion Tooling Stands, by Dennis D. Huffman 4-107

Annealing

Radiant-Wall Furnace Anneals Stainless Sheet Vertically 5-139

Appliances

The Westinghouse Refrigerator Story, by Fred L. Siegrist 5-69

Automation

What Automation Can Do ... in Arc Welding 2-67

What Automation Can Do ... in Brazeing, by Donald C. Dilley 2-92

What Automation Can Do ... in Contour Milling, by Richard A. Mathias 2-65

What Automation Can Do ... in Electroplating, by James R. Kirkhoff 2-84

What Automation Can Do ... in the Foundry, by W. I. Koskella 2-119

What Automation Can Do ... in Induction Heating, by Jack T. Temin 2-63

What Automation Can Do ... in Furnace Heat Treating, by Albert T. Enk 2-59

What Automation Can Do ... in Metal Stamping, by George Crook 2-82

What Automation Can Do ... Need for a Management Philosophy, by Roger W. Bolz 2-54

What Automation Can Do ... in Non-destructive Testing, by Robert G. Strother 2-87

What Automation Can Do ... in Punching Operations, by James A. Good 2-79

What Automation Can Do ... with Industrial Robots, by Julie Harral 2-127

What You Can Do with Automatic Fluxing, by Joseph Bruno Celkupa 2-93

What You Can Do With Automatically Fed Wire, by Charles M. Norlin 2-94

What You Can Do With Conveyored Aluminum Brazing, by Charles H. Busch 2-106

What You Can Do With Hot Gas Brazing, by Harry E. Miller 2-102

What You Can Do With Paste Filler Metals, by Bruce R. Williams 2-98

Brazing

How GE Is Bridging the Processability Gap ... Dip Brazing 7005 Aluminum Fan Vanes, by E. C. Helder and J. F. Rudy 3-110

What Automation Can Do ... in Brazeing, by Donald C. Dilley 2-92

What You Can Do With Automatic Fluxing, by Joseph Bruno Celkupa 2-93

What You Can Do With Automatically Fed Wire, by Charles M. Norlin 2-94

What You Can Do With Conveyored Aluminum Brazing, by Charles H. Busch 2-106

What You Can Do With Hot Gas Brazing, by Harry E. Miller 2-102

What You Can Do With Paste Filler Metals, by Bruce R. Williams 2-98

Carburizing

Another Look at High-Temperature Carburizing, by Norman O. Kates 1-90

Carbide tools

Small Hardness Variations Affect Cemented Carbide Tool Life, by Abraham Ber and E.E. J. Weller 4-139

Tooling Technology in the 1970's ... Carbide Tools Ease Cold Extrusion, by W. L. Kennicott 4-78

Tooling Technology in the 1970's ... Cemented Titanium Carbide Has Big Future, by Herbert S. Kalish 4-82

Tooling Technology in the 1970's ... Machinable Carbides Solve Problems, by Stuart E. Tarkan 4-76

Tooling Technology in the 1970's ... Titanium Carbide Coating Raises Wear Resistance of Inserts, by Gerhard Persson 4-87

Cast iron

How Fiat Makes and Uses Castings, by Sergio Gallo 5-141

Ceramic tools

Tooling Technology in the 1970's ... Ceramic Inserts Expedite Machining, Staff Report 4-84

Cemented carbides

Small Hardness Variations Affect Cemented Carbide Tool Life, by Abraham Ber and E. J. Weller 4-139

Tooling Technology in the 1970's ... Cemented Titanium Carbide Has Big Future, by Herbert S. Kalish 4-82

Characterization

Materials Systems: A Character Analysis, by William M. Duke 1-80

Cold extrusion

Cold Extruding Steel, by Donald J. Blickwede 5-76

Composite materials

Aluminum-Boron Composites for Aerospace Structures, by H. L. Christian, H. D. Forest, and M. D. Weisinger .. 5-113

Materials Technology for Borsic-Aluminum Aircraft Parts, by Kenneth G. Kreider and Edward M. Breinan 5-104

Cooling curves

Cooling Transformation Diagram for AISI O1 Tool Steel 2-72

How Grain Size and Cooling Rate Affect AISI 8620, by Clements F. zurLippe and John D. Grozier 1-94

Cost analysis

Bridging the Processability Gap ... Cost Factors Affecting Titanium Forming, by C. C. Lacy and A. T. Taylor 3-76

Creep forming	
Bridging the Processability Gap . . .	
Creep Forming Is a Production Process, by Louis E. Frost	3-86
Tooling Technology in the 1970's . . .	
A Die Material for Creep-Forming Titanium, by J. Barry Hartland and R. William Breitzig	4-135
Die castings	
Case for Vibratory Finishing of Zinc Die Castings, by William H. Safranek and Hugh R. Miller	6-88
Compositions and Properties of Die Casting Alloys	6-93
Tooling Technology in the 1970's . . .	
Maraging Steels for Die Casting, by Alexander Nagy	4-70
Dies	
Tooling Technology in the 1970's . . .	
Why Tools and Die Fail, by John Y. Riedel	4-101
Dip brazing	
How GE Is Bridging the Processability Gap . . . Dip Brazing 7005 Aluminum Fan Vanes, by E. C. Heider and J. F. Rudy	3-110
Editorial	
Architect of Tomorrow's Products, by Allen G. Gray	1-79
Bridging the Processability Gap, by Allen G. Gray	3-67
Design Opportunities With Materials, by Allen G. Gray	5-67
Finishing Technology Meets Today's Challenges, by Allen G. Gray	6-65
The Materials Engineer's Stake in Conservation, by Allen G. Gray	4-67
Where Improvements Will Come From, by Allen G. Gray	2-53
Electrochemical machining	
How GE Is Bridging the Processability Gap . . . An ECM Process for Drilling Deep Holes, by Cletis Jackson	3-106
How GE Is Bridging the Processability Gap . . . Electrolyte Control in Electrochemical Machining, by T. M. Mercer	3-136
Electron-beam refining	
What Users of Stainless Steel Can Do About the Nickel Shortage . . . E-B Refining Upgrades 26Cr-1Mo Stainless, by Eric Gregory and Roy J. Knoth	1-114
Electropainting	
Electropainting . . . The 'Near Perfect' Method, by H. L. Stein	6-75
Electroplating	
Cyanide Zinc Plating Today, by Robert R. Bair	6-72
Selecting Electropolated Metals, by Leo Miszel	6-110
Standards for Plating on Plastics, Staff Report	6-83
Stretching Nickel in Electroplating and Alternate Finishes, Staff Report	6-66
What Automation Can Do . . . in Electroplating, by James R. Kirkhoff	2-84
Extrusion	
Cold Extruding Steel, by Donald J. Blickwede	5-76
Process Factors Affecting Finish of Aluminum Alloy Extrusions, by Edmund C. Franz	6-80
Tooling Technology in the 1970's . . . Where Aluminum Extrusion Tooling Stands, by Dennis D. Huffman	4-107
Failure	
How Cracks Grow in Structural Steels, by William G. Clark Jr.	5-81
Tooling Technology in the 1970's . . . Why Tools and Dies Fail, by John Y. Riedel	4-101
Fasteners	
Fastener Simplification at Ford, by Ralph E. Vandeventer	5-99
Finishing	
Case for Vibratory Finishing of Zinc Die Castings, by William H. Safranek and Hugh R. Miller	6-88
Curing Paint With Electron Beams, Staff Report	6-86
Cyanide Zinc Plating Today, by Robert R. Bair	6-72
Electropainting . . . The 'Near Perfect' Method, by H. L. Stein	6-75
Evaluating Paint Systems for Aircraft, by M. C. Miyaji and W. M. Sutherland	6-101
How GE Is Bridging the Processability Gap . . . Coatings Lengthen Jet Engine Life, by Frank J. Hermanek Jr.	3-104
Practical Finishes for Magnesium, by H. K. DeLong	6-105
Process Factors Affecting Finish of Aluminum Alloy Extrusions, by Edmund C. Franz	6-80
Selecting Electropolated Metals, by Leo Miszel	6-110
Stretching Nickel in Electroplating and Alternate Finishes, Staff Report	6-66
What to Consider in Specifying Zinc Coatings, by Ernest W. Horvick	6-124
Forging	
Assuring Quality in a King-Sized Forging, by Fred L. Siegrist	4-105
Forming	
Bridging the Processability Gap . . . Creep Forming Is a Production Process, by Louis E. Frost	3-86
Tooling Technology in the 1970's . . . A Die Material for Creep-Forming Titanium, by J. Barry Hartland and R. William Breitzig	4-135
What Automation Can Do . . . in Metal Stamping, by George Crook	2-82
What Automation Can Do . . . in Punching Operations, by James A. Good	2-79
Galvanizing	
New Knowledge About Sheet Steel . . . How Galvanizing Affects Structure and Properties, by Donald J. Blickwede	1-86
Gas turbines	
How GE Is Bridging the Processability Gap . . . Coatings Lengthen Jet Engine Life, by Frank J. Hermanek Jr.	3-104
How GE Is Bridging the Processability Gap . . . An ECM Process for Drilling Deep Holes, by Cletis Jackson	3-106
How GE Is Bridging the Processability Gap . . . Electrolyte Control in Electrochemical Machining, by T. M. Mercer	1-136
Materials Systems in Action . . . The Pratt & Whitney Gas Turbine Story, Elihu F. Bradley, D. G. Phinney, and Matthew J. Donachie Jr.	3-68
What Users of Stainless Steel Can Do About the Nickel Shortage . . . E-B Refining Upgrades 26Cr-1Mo Stainless, by Eric Gregory and Roy J. Knoth	1-114
Plastic-Lined Steel Pipe for the Process Industries, by L. W. Gleekman and J. M. Ayres	1-99
Where to Consider the 200 and 400 Grades, by Robert H. Kaltenhauser	1-99
Where to Consider the Straight-Chromium Grades, by Frank M. Richmond	1-103
Heat treatment	
Another Look at High-Temperature Carburizing, by Norman O. Kates	1-90
Convenience, Economy Characterize Versatile Quenchant, by Anthony A. Wolinski	4-123
Guide for Selecting Filler Metals for Heat-Treatable Aluminum Alloys	3-93
Guide for Selecting Filler Metals for Nonheat-Treatable Aluminum Alloys	3-93
Heat Treating Tool Steels, Staff Report	4-89
Typical Heat Treatment and Characteristics of AISI Tool Steels	4-92
What Automation Can Do . . . in Furnace Heat Treating, by Albert T. Enk	2-59
What Automation Can Do . . . in Induction Heating, by Jack T. Temin	2-63
Heat-resistant alloys	
Tooling Technology in the 1970's . . . Superalloys for Supertools, by E. J. Lane	4-68
High-speed tool steels	
Tooling Technology in the 1970's . . . AISI M47: An Economical High-Speed Steel With Extra Hardness, by Paul R. Borneman	4-88
Tooling Technology in the 1970's . . . Matrix Grades Offer Strength, Toughness, by Alan M. Bayer	4-86
Tooling Technology in the 1970's . . . An Ultrahard Steel for Machining Jet Age Materials, by Harry H. Cornell	4-83
Induction heating	
What Automation Can Do . . . in Induction Heating, by Jack T. Temin	2-63
Induction sintering	
Induction Sintering Has Potential for Powder Metal Parts, by Joel S. Hirschhorn, Manohar Samat, and George M. Maxwell	5-135
Joining	
Bridging the Processability Gap . . . Solving Problems in Making the 'Biggest Bird', by J. E. Gilmer	3-81
Fastener Simplification at Ford, by Ralph E. Vandeventer	5-99
Machining	
How GE Is Bridging the Processability Gap . . . An ECM Process for Drilling Deep Holes, by Cletis Jackson	3-106
How GE Is Bridging the Processability Gap . . . Electrolyte Control in Electrochemical Machining, by T. M. Mercer	1-136
Magnesium alloys	
Practical Finishes for Magnesium, by H. K. DeLong	6-105
Maraging steels	
Tooling Technology in the 1970's . . . Maraging Steels for Die Casting, by Alexander Nagy	4-70
Materials systems	
Materials Systems: A Character Analysis, by William M. Duke	1-80
Materials Systems in Action . . . The Pratt & Whitney Gas Turbine Story, Elihu F. Bradley, D. G. Phinney, and Matthew J. Donachie Jr.	3-68
The Westinghouse Refrigerator Story, by Fred L. Siegrist	5-69
Milling	
What Automation Can Do . . . in Contour Milling, by Richard A. Mathias	2-65
Nickel plating	
Stretching Nickel in Electroplating and Alternate Finishes, Staff Report	6-66
Nickel shortage	
Stretching Nickel in Electropalting and Alternate Finishes, Staff Report	6-66
What Users of Stainless Steel Can Do About the Nickel Shortage	
E-B Refining Upgrades 26Cr-1Mo Stainless, by Eric Gregory and Roy J. Knoth	1-114
Plastic-Lined Steel Pipe for the Process Industries, by L. W. Gleekman and J. M. Ayres	1-99
Where to Consider the 200 and 400 Grades, by Robert H. Kaltenhauser	1-99
Where to Consider the Straight-Chromium Grades, by Frank M. Richmond	1-103
Nondestructive testing	
What Automation Can Do . . . in Nondestructive Testing, by Robert G. Strother	2-87
Painting	
Bridging the Processability Gap . . . Solving Problems in Making the 'Biggest Bird', by J. E. Gilmer	3-81
Curing Paint With Electron Beams, Staff Report	6-86
Electropainting . . . The 'Near Perfect' Method, by H. L. Stein	6-75
Evaluating Paint Systems for Aircraft, by M. C. Miyaji and W. M. Sutherland	6-101
Pipe	
What Users of Stainless Steel Can Do About the Nickel Shortage . . . Plastic-Lined Steel Pipe for the Process Industries, by L. W. Gleekman and J. M. Ayres	1-122
Plastics	
Mechanical and Physical Properties of Engineering Plastics	5-88
Standards for Plating on Plastics, Staff Report	6-83
Tooling Technology in the 1970's . . . Carvable Plastics for Models, Patterns, by Richard B. Peterson	4-72
Tooling Technology in the 1970's . . . Where Urethanes Are Used in the Foundry, by James Kosmala	4-83

What Users of Stainless Steel Can Do About the Nickel Shortage . . . Plastic-Lined Steel Pipe for the Process Industries, by L. W. Gleekman and J. M. Ayres 1-122

Powder metal parts

Induction Sintering Has Potential for Powder Metal Parts, by Joel S. Hirschhorn, Manohar Samat, and George M. Maxwell 5-135

Punching

What Automation Can Do . . . in Punching Operations, by James A. Good .. 2-79

Quenching media

Convenience, Economy Characterize Versatile Quenchants, by Anthony A. Wolinski 4-123

Sheet

New Knowledge About Sheet Steel . . . How Galvanizing Affects Structure and Properties, by Donald J. Blickwede 1-86

Sintering

Induction Sintering Has Potential for Powder Metal Parts, by Joel S. Hirschhorn, Manohar Samat, and George M. Maxwell 5-135

Springs

Ultrahigh-Strength Stainless for Light-Gage Spring Applications, by Seth R. Thomas and Eric C. Sharpless 5-131

Stainless steels

Radiant-Wall Furnace Anneals Stainless Sheet Vertically 5-139

Tooling Technology in the 1970's . . . A Stainless Grade for Plastic Molds, by William Young 4-71

Ultrahigh-Strength Stainless for Light-Gage Spring Applications, by Seth R. Thomas and Eric C. Sharpless 5-131

What Users of Stainless Steel Can Do

About the Nickel Shortage . . . E-B Refining Upgrades 26Cr-1Mo

Stainless, by Eric Gregory and Roy J. Knoth 1-114

Plastic-Lined Steel Pipe for the Process Industries, by L. W. Gleekman and J. M. Ayres 1-99

Where to Consider the 200 and 400 Grades, by Robert H. Kaltenhauser

Where to Consider the Straight-Chromium Grades, by Frank M. Richmonde 1-103

Stamping

What Automation Can Do . . . in Metal Stamping, by George Crook 2-82

Standards

Standards for Plating on Plastics, Staff Report 6-83

Steels

Cold Extruding Steel, by Donald J. Blickwede 5-76

How Cracks Grow in Structural Steels, by William G. Clark Jr. 5-81

New Knowledge about Sheet Steel . . . How Galvanizing Affects Structure and Properties, by Donald J. Blickwede ..

Tooling Technology in the 1970's . . .

Managing Steels for Die Casting, by Alexander Nagy 4-70

Tooling Technology in the 1970's . . . Matrix Grades Offer Strength, Toughness, by Alan M. Bayer 4-86

New Developments Boost Popularity of S7, by James J. McCarthy ..

P20: A Familiar Grade Updated for Molders, by E. E. Lull 4-74

A Stainless Grade for Plastic Molds, by William Young 4-71

Superalloys for Supertoools, by E. J. Lane 4-68

Titanium Carbide Coating Raises Wear Resistance of Inserts, by Gerhard Persson 4-87

An Ultrahard Steel for Machining Jet Age Materials, by Harry H. Cornell ..

Where Urethanes Are Used in the Foundry, by James Kosmala 4-83

Typical Heat Treatment and Characteristics of AISI Tool Steels 4-92

Where Aluminum Extrusion Tooling Stands, by Dennis D. Huffman 4-107

Why Tools and Dies Fail, by John Y. Riedel 4-101

Structural steels

How Cracks Grow in Structural Steels, by William G. Clark Jr. 5-81

Technology Forecast

Technology Forecast: Surveying the 70's 1-18

Titanium

Bridging the Processability Gap . . . Cost Factors Affecting Titanium Forming, by C. C. Lacy and A. T. Taylor 3-76

Tooling

A Die Material for Creep-Forming Titanium, by J. Barry Hartland and R. William Breitzig 4-135

Heat Treating Tool Steels, Staff Report 4-89

Small Hardness Variations Affect Cemented Carbide Tool Life, by Abraham Ber and E. J. Weller 4-139

Tooling Technology in the 1970's . . .

AISI M47: An Economical High-Speed Steel With Extra Hardness, by Paul B. Borneman 4-88

Carbide Tools Ease Cold Extrusion, by W. L. Kennicott 4-78

Carvable Plastics for Models, Patterns, by Richard B. Peterson 4-72

Cemented Titanium Carbide Has Big Future, by Herbert S. Kalish ..

Ceramic Inserts Expedite Machining, Staff Report 4-82

Die Blocks of Forged H13 Are Tough, by Arne Omsen and Bengt E. Skoog 4-84

Graphite Tool Steel for Precision Parts, by Philip A. Nagy 4-75

Machinable Carbides Solve Problems, by Stuart E. Tarkan 4-80

Graphite Tool Steel for Precision Parts, by Philip A. Nagy 4-80

Machinable Carbides Solve Problems, by Stuart E. Tarkan 4-76

Managing Steels for Die Casting, by Alexander Nagy 4-70

Matrix Grades Offer Strength, Toughness, by Alan M. Bayer 4-86

New Developments Boost Popularity of S7, by James J. McCarthy ..

P20: A Familiar Grade Updated for Molders, by E. E. Lull 4-74

A Stainless Grade for Plastic Molds, by William Young 4-71

Superalloys for Supertoools, by E. J. Lane 4-68

Titanium Carbide Coating Raises Wear Resistance of Inserts, by Gerhard Persson 4-87

An Ultrahard Steel for Machining Jet Age Materials, by Harry H. Cornell ..

Where Urethanes Are Used in the Foundry, by James Kosmala 4-83

Typical Heat Treatment and Characteristics of AISI Tool Steels 4-92

Where Aluminum Extrusion Tooling Stands, by Dennis D. Huffman 4-107

Why Tools and Dies Fail, by John Y. Riedel 4-101

Tool steels

Heat Treating Tool Steels, Staff Report 4-89

Tooling Technology in the 1970's . . . Die Blocks of Forged H13 Are Tough, by Arne Omsen and Bengt E. Skoog 4-75

Graphite Tool Steel for Precision Parts, by Philip A. Nagy 4-80

Matrix Grades Offer Strength, Toughness, by Alan M. Bayer 4-86

New Developments Boost Popularity of S7, by James J. McCarthy ..

P20: A Familiar Grade Updated for Molders, by E. E. Lull 4-74

An Ultrahard Steel for Machining Jet Age Materials, by Harry H. Cornell ..

Where Urethanes Are Used in the Foundry, by James Kosmala 4-83

Typical Heat Treatment and Characteristics of AISI Tool Steels 4-92

Vibratory finishing

Case for Vibratory Finishing of Zinc Die Castings, by William H. Safranek and Hugh R. Miller 6-88

Welding

Bridging the Processability Gap . . . Solving Problems in Making the 'Biggest Bird', by J. E. Gilmer 3-81

What Automation Can Do . . . in Arc Welding 2-67

Zinc plating

Cyanide Zinc Plating Today, by Robert R. Bair 6-72

What to Consider in Specifying Zinc Coatings, by Ernest W. Horwick 6-124

AUTHOR INDEX

Ayres, J. M.	1-122	Gregory, Eric	1-114	Miyaji, M. C.	6-101
Bair, Robert R.	6-72	Grozier, John W.	1-94	Nagy, Alexander	4-70
Bayer, Alan M.	4-86	Harragh, Jule	2-127	Nagy, Philip A.	4-80
Ber, Abraham	4-139	Hartland, J. Barry	4-135	Norlin, Charles M.	2-94
Blickwede, Donald J.	5-76	Heider, E. C.	3-110	Omsen, Arne	4-75
Bolz, Roger W.	2-54	Hermanek, Frank J. Jr.	3-104	Persson, Gerhard	4-87
Borneman, Paul R.	4-88	Hirschhorn, Joel S.	5-135	Peterson, Richard B.	4-72
Broadley, Elihu F.	3-68	Hovrick, Ernest W.	6-125	Phinney, D. G.	3-68
Breinan, Edward M.	5-104	Huffman, Dennis D.	4-107	Richmond, Frank M.	1-103
Breitzig, R. William	4-135	Jackson, Cletis	3-106	Riedel, John Y.	4-100
Busch, Charles H.	2-106	Kalish, Herbert S.	4-82	Rudy, J. F.	3-110
Celkupa, Joseph Bruno	2-3	Kaltenhauser, Robert H.	1-99	Safranek, William H.	6-88
Christian, J. L.	5-113	Kates, Norman O.	1-90	Samat, Manohar	5-135
Clark, William G. Jr.	5-81	Kennicott, W. L.	4-78	Sharpless, Eric C.	5-131
Cornell, Harry H.	4-83	Kirkhoff, James R.	2-84	Siegrist, Fred L.	4-105
Crockett, L. K.	3-99	Knoth, Roy J.	1-114	Skoog, Bengt E.	4-75
Crook, George	2-82	Korb, Lawrence J.	3-99	Stein, H. L.	6-75
DeLong, H. K.	6-105	Koskella, W. I.	2-119	Strother, Robert G.	2-87
Dilley, Donald D.	2-92	Kosmala, James	4-83	Sutherland, W. M.	6-101
Donachie, Matthew J. Jr.	3-68	Kreider, Kenneth G.	5-104	Tarkan, Stuart E.	4-76
Duke, William M.	1-80	Lacy, C. C.	3-76	Taylor, A. T.	3-76
Enk, Albert T.	2-59	Lane, E. J.	4-68	Temin, Jack T.	2-63
Forest, J. D.	5-113	Lull, E. E.	4-79	Thomas, Seth R.	5-131
Franz, Edmund C.	6-80	Mathias, Richard A.	2-65	VanDeventer, Ralph E.	5-99
Frost, Louis E.	3-86	Maxwell, George M.	5-135	Weisinger, M. D.	5-113
Gallo, Sergio	5-141	McCarthy, James J.	4-74	Weller, E. J.	4-139
Gilmer, J. E.	3-81	Mercer, T. M.	3-136	Williams, Bruce R.	2-98
Gleekman, L. W.	1-122	Miller, Harry M.	2-102	Wolinski, Anthony A.	4-123
Good, James A.	2-79	Miller, Hugh R.	6-88	Young, William	4-71
Gray, Allen G.	1-79; 2-53; 3-67	Missel, Leo	6-110	zurLippe, Clements F.	1-94
	4-67; 5-67; 6-65				

METAL PROGRESS

Subject Index

Vol. 98, July 1970 through December 1970

Alloy steels

Annealing Aids Machinability of AISI 4140, by Ford C. Brandon 1-103

Aluminum alloys

Aluminum Alloys in the 70's (Round Table) 3-68
 Casting the Vega Block at Massena, by Donald F. Baxter Jr. 4-168
 Eddy Currents Check Aluminum Strip, by James J. Regan and Ron J. Botso 5-113
 Practices and Equipment for Heat Treating Aluminum Alloys, by David S. Thompson, Ogle R. Singleton, Robert D. McGowan, and Grant E. Spangler 3-78
 Properties, Characteristics, and Applications of Heat-Treatable Aluminum Alloys (data sheet) 3-86

Aluminum oxide

Engineering With High-Alumina Ceramics, by Lawrence E. Ferreira, Daniel D. Briggs, and Ronald G. Barnhart 6-78
 Thermal, Mechanical, and Electrical Properties of Typical High-Alumina Ceramics (data sheet) 6-85

Annealing

Annealing Aids Machinability of AISI 4140, by Ford C. Brandon 1-103

Appliances

Nonmetallic Application Trends in Refrigerators, by Fred L. Siegrist 1-115

Automobiles

Casting the Vega Block at Massena, by Donald F. Baxter Jr. 4-168
 Determining Wear of Tappets and Cams at Volkswagen, by Erwin Just 2-110
 Gear Rolling at Livonia, by Carl R. Weymueller 4-175
 Plastic Partsmaking at Saline, by Fred L. Siegrist 4-153
 Testing Automobile Components on Production Lines, by Carl R. Weymueller 2-72
 Tooling Alloys for Automotive Dies, by Ferdinand L. Ewald 5-67

Axes

Total Approach to Reliability of Case-Hardened Parts, by Stanislaw Mocarski 3-96

Batch carburizing

Batch Carburizing at Ft. Wayne, by William C. Hiatt and James P. Crosbie 4-143

Bend radius

Calculating Minimum Bend Radii From Ductility Rating, by Charles T. Yang 5-107

Brittleness

Avoiding Brittle Fractures in Cold-Formed ASTM 515 Steel, by Oscar W. Albritton 3-115

Carburizing

Batch Carburizing at Ft. Wayne, by William C. Hiatt and James P. Crosbie 4-143

Case hardening

Total Approach to Reliability of Case-Hardened Parts, by Stanislaw Mocarski 3-96

Ceramics

Engineering With High-Alumina Ceramics, by Lawrence E. Ferreira, Daniel D. Briggs, and Ronald G. Barnhart 6-78
 Thermal, Mechanical, and Electrical Properties of Typical High-Alumina Ceramics (data sheet) 6-85

Casting

Casting the Vega Block at Massena, by Donald F. Baxter Jr. 4-168

Copper

Properties and Applications of Wrought Copper and Copper Alloys (data sheet) 1-85
 What's Ahead for Copper in the 70's (round table) 1-73

Copper alloys

Properties and Applications of Wrought Copper and Copper Alloys (data sheet) 1-85
 What's Ahead for Copper in the 70's (round table) 1-73

Eddy current testing

Eddy Currents Check Aluminum Strip, by James J. Regan and Ron J. Botso 5-113

Editorial

New Profit Opportunities, by Allen G. Gray 6-53
 Partsmaking: Our Biggest Challenge, by Allen G. Gray 4-117
 Quality: Opportunity for Leadership, by Allen G. Gray 2-71
 Think Smarter Sooner, by Allen G. Gray 3-67
 We Must Be Sure, by Allen G. Gray 5-55
 You and the Pollution Problem, by Allen G. Gray 1-71

Electron beam welding

Electron Beam Welder Has Nonvacuum Capability, Staff Report 5-56

Electronic devices

Soldering and Welding Electronic Joints, by Jerome W. Kaufman 1-95

Electroslag process

Continuous Electroslag Melting Process Turns Out a Variety of Steels, Staff Report 3-121

Explosive bonding

Explosive Bonding Dissimilar Metals, by Thomas

J. Enright, William F. Sharp, and Oswald R. Bergmann 1-107

Fabrication

Survey Report: Processes for Today and Tomorrow 4-127

Failure

In Many Investigations, Standard Instruments Are Adequate, by C. Howard Craft 5-79
 Investigating an Aircraft Disaster, by Ralph D. Barer and Thomas S. Sterling 5-84
 Solving an Unusual Shaft Failure, by Jack J. Bodzin and Gordon W. Houser 5-103
 Why Gears Fail, by Lester E. Alban 5-95

Forging

Hot Forging at Portland, Staff Report 4-150

Fractography

Fractography Explains Failures in Soldered Joints, by David B. Martin and William R. Merwarth 2-103

Fracturing

Avoiding Brittle Fractures in Cold-Formed ASTM 515 Steel, by Oscar W. Albritton 3-115

Friction welding

Inertia Welding at Mentor, Staff Report 4-160

Gear rolling

Gear Rolling at Livonia, by Carl R. Weymueller 4-175

Gears

Total Approach to Reliability of Case-Hardened Parts, by Stanislaw Mocarski 3-96
 Why Gears Fail, by Lester E. Alban 5-95

Heat treatment

High Volume Key to Economic Property Control, Staff Report 3-122

Practices and Equipment for Heat Treating Aluminum Alloys, by David S. Thompson, Ogle R. Singleton, Robert D. McGowan and Grant E. Spangler 3-78

Properties, Characteristics, and Applications of Heat-Treatable Aluminum Alloys (data sheet) 3-86

Hot working

Hot Forging at Portland, Staff Report 4-150

Impact tests

Correlating European and American Impact Tests, by Joseph G. Dunleavy and Joseph W. Spretnak 5-119

Inertia welding

Inertia Welding at Mentor, Staff Report 4-160

Low-temperature steels	Total Quality Approach for Pressure Vessels, Edward S. Proctor	2-80
Choosing Steels for Low-Temperature Service, by E. Gary Marshall	3-91	
Machinability	Partsmaking	Stainless steels
Annealing Aids Machinability of AISI 4140, by Ford C. Brandon	How We Will Make Parts in the 70's (round table)	An Austenitic Steel for High-Temperature Ser- vice Applications, by Lennart Egner
Modification Adds Machinability to Type 303, by Curtis W. Kovach and Arthur Moskowitz	4-118	3-102
Materials selection	Plastics	Modification Adds Machinability to Type 303, by Curtis W. Kovach and Arthur Moskowitz
Survey Report: Processes for Today and To- morrow	Nonmetallic Application Trends in Refrigera- tors, by Fred L. Siegrist	3-102
Materials systems	Plastic Partsmaking at Saline, by Fred L. Siegrist	4-115
Nonmetallic Application Trends in Refrigera- tors, by Fred L. Siegrist	4-153	
Mechanical testing	Pollution control	Steels
Correlating European and American Impact Tests, by Joseph G. Dunleavy and Joseph W. Spretak	Control Considerations in Washing, Painting, and Soluble Oil Removal, by Chester R. Wiedemann	An Austenitic Steel for High-Temperature Service Applications, by Lennart Egner
Determining Wear of Tappets and Cams at Volkswagen, by Erwin Just	Disposal of Cyanide Heat Treating Wastes, by Gordon Vivian	Avoiding Brittle Fractures in Cold-Formed ASTM 515 Steel, by Oscar W. Albritton
How Fatigue Affects Bolted Joints at High Temperatures, by Karl H. Beelich	Environmental Detection Systems, by Richard C. Carnes	Choosing the Right EX Steels, by Carl R. Wey- mueller
Simulating Years of Truck Service in Weeks, by Carl R. Weymueller	High-Energy Wet Gas Cleaning for the Basic Oxygen OG Process, by Richard W. Adams Incinerators for the Metalworking Industry, by Thomas A. Blanchard	Choosing Steels for Low-Temperature Service, by E. Gary Marshall
Melting	Recommendations for Dust Collection Systems, by Donald H. Taylor	The EX Steels and Equivalent Standard Grades (data sheet)
Continuous Electroslag Melting Process Turns Out a Variety of Steels, Staff Report	Recovering Acid and Soluble Ferrous Sulfate From Waste Pickle Liquor, by R. J. Lackner Reverse Osmosis for Waste Water Treatment, by Gordon F. Leitner	How a Fabricator Views Strain Aging of Low- Carbon Sheet Steel, by M. Robert Baren and Paul G. Nelson
Metallographic exhibit	Technology: the Key to Pollution Control, Staff Report	6-87
Etch Pits Determine Fracture Planes in Beryllium Sheet	Three Ways to Minimize Water Pollution in Cleaning, Finishing, by Marshall A. Bland Water Conservation by Re-Use at Republic, by David G. Berkebile	
Metallography	Powder metallurgy parts	Strain aging
Basic Tool for the Materials and Process Engineer	Making P/M Parts at Gaiopolis, by Harry E. Chandler	How a Fabricator Views Strain Aging of Low- Carbon Sheet Steel, by M. Robert Baren and Paul G. Nelson
Fractography Explains Failures in Soldered Joints, by David B. Martin and William R. Merwarth	Nitriding Improves Fatigue Resistance of P/M Parts, Staff Report	6-87
Metallographic Reagents for Iron and Steel (data sheet)	4-140	
Metal producing	Pressure vessels	Testing
High Volume Key to Economic Property Con- trol, Staff Report	Total Quality Approach for Pressure Vessels, by Edward S. Proctor	Basic Tool for the Materials and Process Engineer
Neutron radiography	4-127	2-94
Neutron Radiography Complements X-Ray, by Charles R. Wilson	Processing	Determining Wear of Tappets and Cams at Volkswagen, by Erwin Just
Nitriding	Survey Report: Processes for Today and To- morrow	Eddy Currents Check Aluminum Strip, by James J. Regan and Ron J. Botso
Nitriding Improves Fatigue Resistance of P/M Parts, Staff Report	4-127	5-113
Nondestructive testing	Shafts, power	Fractography Explains Failures in Soldered Joints, by David B. Martin and William R. Merwarth
Eddy Currents Check Aluminum Strip, by James J. Regan and Ron J. Botso	Solving an Unusual Shaft Failure, by Jack J. Bodzin and Gordon W. Houser	2-103
Neutron Radiography Complements X-Ray, by Charles R. Wilson	5-103	
Testing Automobile Components on Production Lines, by Carl R. Weymueller	Sheet	How Fatigue Affects Bolted Joints at High Temperatures, by Karl H. Beelich
2-75	How a Fabricator Views Strain Aging of Low- Carbon Sheet Steel, by M. Robert Baren and Paul G. Nelson	2-115
2-75	6-87	
2-75	Soldering	Metallographic Reagents for Iron and Steel (data sheet)
2-75	Fractography Explains Failures in Soldered Joints, by David B. Martin and William R. Merwarth	2-87
2-75	Soldering and Welding Electronic Joints, by Jerome W. Kaufman	Neutron Radiography Complements X-Ray, by Charles R. Wilson
2-75	1-95	2-107
2-75	Tooling	Simulating Years of Truck Service in Weeks, by Carl R. Weymueller
2-75	Tooling Alloys for Automotive Dies, by Ferdinand L. Ewald	2-107
2-75	Tool steels	Trucks
2-75	Classification and Selection of Tool Steels (data sheet)	Simulating Years of Truck Service in Weeks, by Carl R. Weymueller
2-75	Tooling Alloys for Automotive Dies, by Ferdinand L. Ewald	5-73
2-75	Welding	Welding
2-75	Electron Beam Welder Has Nonvacuum Cap- ability, Staff Report	Electron Beam Welder Has Nonvacuum Cap- ability, Staff Report
2-75	Inertia Welding at Mentor, Staff Report	5-56
2-75	Soldering and Welding Electronic Joints, by Jerome W. Kaufman	Inertia Welding at Mentor, Staff Report
2-75	1-95	4-160
2-75	AUTHOR INDEX	Soldering and Welding Electronic Joints, by Jerome W. Kaufman
2-75	Adams, Richard W.	1-107
2-75	Dunleavy, Joseph F.	5-119
2-75	Egner, Lennart	3-102
2-75	Enright, Thomas J.	1-107
2-75	Ewald, Ferdinand L.	4-125; 5-67
2-75	Ferreira, Lawrence E.	6-78
2-75	Fields, Davis, Jr.	4-120
2-75	Girardi, Daniel J.	4-126
2-75	Gray, Allen G.	1-71; 2-71; 3-67;
2-75	Hiatt, William C.	4-117; 5-55; 6-53
2-75	Houser, Gordon W.	4-143
2-75	Just, Erwin	5-103
2-75	Kaufman, Jerome W.	1-95
2-75	Kovach, Curtis W.	1-105
2-75	Lackner, R. J.	6-58
2-75	Leitner, Gordon F.	6-62
2-75	Lottridge, Neil M.	2-110
2-75	Martin, David B.	4-121
2-75	McGowan, Robert D.	3-78
2-75	Meigun, Edmund L.	4-125
2-75	Merwarth, William R.	2-103
2-75	Milano, Nicholas P.	4-122
2-75	Mocarski, Stanislaw	3-96
2-75	Moskowitz, Arthur	1-105
2-75	Nelson, Paul G.	6-87
2-75	Proctor, Edward S.	2-80
2-75	Rauch, A. H.	4-126
2-75	Regan, James J.	5-113
2-75	Sharp, William R.	1-107
2-75	Siegrist, Fred L.	1-115; 4-153
2-75	Singleton, Ogle R.	3-78
2-75	Spangler, Grant E.	3-78
2-75	Spretak, Joseph W.	5-119
2-75	Sterling, Thomas S.	5-84
2-75	Taylor, Donald H.	6-63
2-75	Thompson, David S.	3-78
2-75	Versaw, W. Dean	4-121
2-75	VerSnyder, Francis	4-124
2-75	Vivian, Gordon	6-61
2-75	Weymueller, Carl R.	2-72; 2-107; 4-130; 4-175
2-75	Wiedemann, Chester R.	6-66
2-75	Wilson, Charles R.	2-75
2-75	Yang, Charles T.	5-107